Prime Hook National Wildlife Refuge

DD-Array Photomonitoring Summary

(11 May 2011- 17 June 2011 & 17 June 2011- 8 July 2011)

Prepared by Delaware Division of Fish and Wildlife, Natural Heritage and Endangered Species Program

The primary goal of this photomonitoring effort was to determine the status of the Prime Hook National Wildlife Refuge (PHNWR) Delmarva fox squirrel (*Sciurus niger cinereus*, DFS) population. Squirrels were documented at the refuge during photomonitoring efforts in 2004 and 2008 and in past years with trapping, road mortality reports and nest box checks. Locations where DFS have been documented prior to 2011 are shown in Figure 1. This project was conducted by Delaware Division of Fish and Wildlife, Natural Heritage and Endangered Species Program (NHESP) and PHNWR.

METHODS:

Fifteen cameras were set up on 11 May and 4 more (DD23, 24, 30, and PH05) were set up on 12 May (Figure 2). Five of the cameras were the newest Reconyx model (PC900 Covert Pro IR) supplied by PHNWR (DDPH01-05) and the rest were the older Reconyx model RC55 RapidFire Color IR supplied by the NHESP. The original set of 19 cameras was removed on 17 June 2011. The 5 PC900s were then redeployed to new locations to fill some gaps in the initial array and were operational from 17 June 2011- 8 July 2011 (DD_array2).

All cameras were set to operate 24 hours/day and to record date and time for each picture. Trigger time was set to *immediate* so that an image was captured immediately upon detection. The camera was also set to take 3 shots in quick succession (*rapidfire* setting) and then not take any pictures for one minute (set to one minute *quiet period*). Every camera was equipped with a compact flash card (1 GB or larger) to store pictures and both rechargeable and alkaline batteries were used (but not mixed within the camera).

All cameras were placed 10-18 feet from traps, which were held in the open position with cable ties. Traps were placed at the base of a large tree and baited with cob corn and a 'squirrel snack' mix which consisted of loose corn, peanuts, and sunflower seeds. Sticks were placed through the traps in an attempt to hold corn cobs inside and make the squirrels stay in front of the camera longer. Camera stations were checked and re-baited 2-3 times per week. Most of the bait was placed inside the traps but some was scattered outside the traps to help draw the squirrels towards the cameras. A generous amount of corn was used at each site (Figure 3).

RESULTS and DISCUSSION:

Delmarva fox squirrels were detected on 10 cameras (Table 1), located throughout the study area (Figure 4) except the release area (Figure 2). The first documentation of a DFS was on 13 May (2 days after set up) at 1007 on camera DD24, which was in the woodlot on the south side of the Coulter property on Deep Branch Road (RD 234). Most of the cameras did not have photo evidence of DFS

before 19 May (8 days after the survey started) and the first DFS was documented at the Entrance Road area on 21 May (10 days after set-up). Most cameras that had DFS also documented gray squirrels. For the second round of monitoring (DD Array2), only 2 cameras obtained pictures of DFS with the first one occurring on 19 June at 1405 (PH05-3) and the second one on 21 June at 0927 (PH01-4). However, these were set up later in the season when DFS might be less likely to come to bait piles because of food availability or activity levels. Delmarva Fox Squirrels were photographed on 8 of 19 cameras during the first survey and 2 of 5 cameras during the second survey. Gray squirrels were photographed on 17 of 19 cameras during the first survey and 5 of 5 during the 2nd survey.

Table 1. Summary from cameras where Delmarva fox squirrels were documented with photomonitoring at Prime Hook National Wildlife Refuge, Sussex County, DE in spring and summer 2011.

Camera Number	No. of photos	Date set-up	Date First DFS Picture	Date Last DFS Picture	DFS Pictures Time of Day
DD18	9	11-May	19-May	25-May	0840-1830
DD22	10	11-May	19-May	5-Jun	0700-1100
DD24	36	12-May	13-May	17-Jun	0830-1830
DD26	45	11-May	19-May	17-Jun	0700-1750
DD29	234	11-May	19-May	31-May	0720-1410
DD31	13	11-May	31-May	17-Jun	0840-1640
DD34	26	11-May	19-May	17-Jun	0830-1800
DDPH03	6	11-May	3-Jun	3-Jun	0840-0842
PH01-4	52	17-Jun	21-Jun	7-Jul	0830-1930
PH05-3	15	17-Jun	19-Jun	21-Jun	0805-1405

Other species documented included red and gray fox (*Vulpes vulpes* and *Urocyon cinereoargenteus*), white-tailed deer (*Odocoileus virginianus*), Virginia opossum (*Didelphis virginiana*), northern raccoon (*Procyon lotor*), eastern box turtle (*Terrapene carolina carolina*), mice (*Peromyscus* spps), ground hog (*Marmota monax*) and various common bird species.

Delmarva fox squirrels have expanded from the woodlot where 17 squirrels were released in 1986 and 1987. In 2011 they were documented using most areas with suitable habitat in the refuge. The locations documented in 2004 and 2008 (Deep Branch Road, the Entrance Road area and the area where DDPH03 was located this year) were still supporting squirrels in 2011. Although photomonitoring cannot provide population size information, this survey documented multiple squirrels as evidenced by seeing 2 DFS in single photographs, DFS with different physical markings and DFS at different cameras at approximately the same time. A minimum of four individuals were confirmed but, given their distribution (up to 1.7 miles apart and separated by water bodies, agricultural fields and marshes), there are likely many more using the refuge.

Cameras 24, 26 and 29 had the highest number of DFS pictures and included the first camera to document a DFS (camera DD24). These three cameras were in the vicinity of houses that were known to

provide food for the squirrels at feeders. It's possible that these squirrels were more habituated to feeders and less likely to shy away from feeding stations.

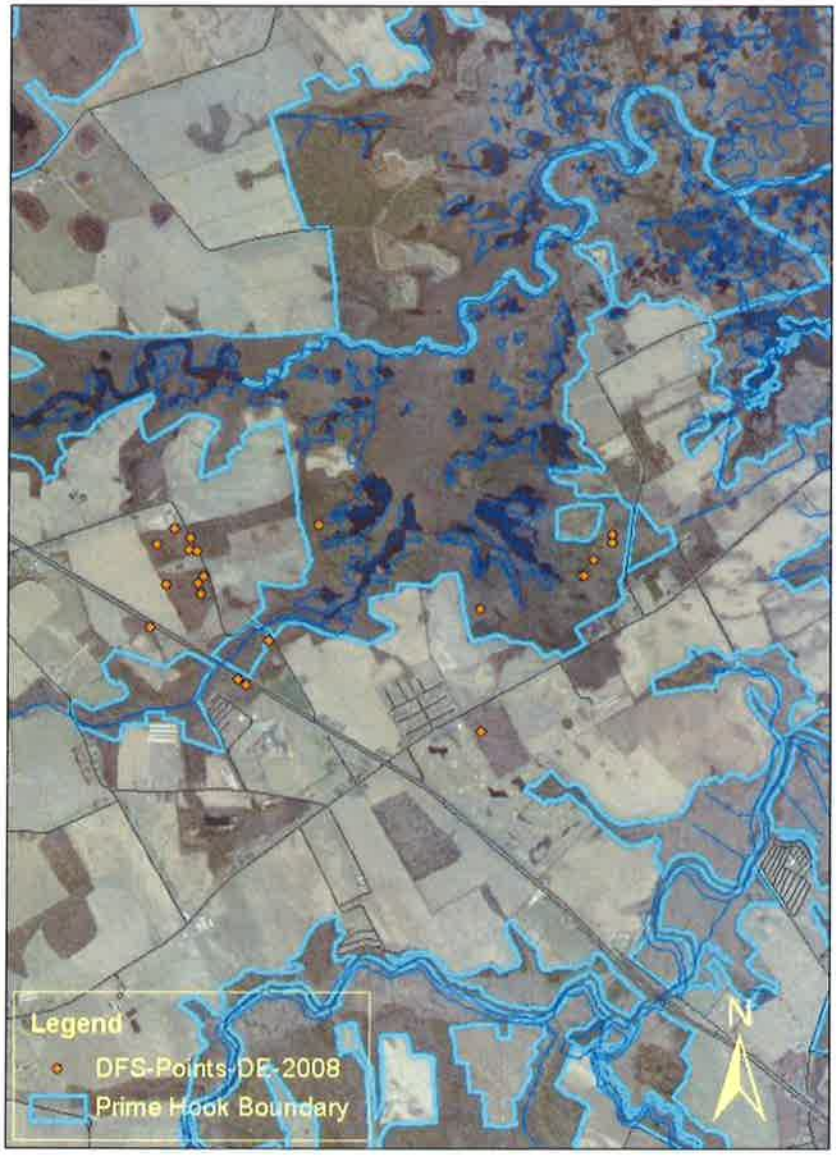

Figure 1. Delmarva fox squirrel locations at Prime Hook National Wildlife Refuge and vicinity as of fall 2008. Note – Refuge boundaries are from 2008 and are not accurate in 2011; more land has been acquired.

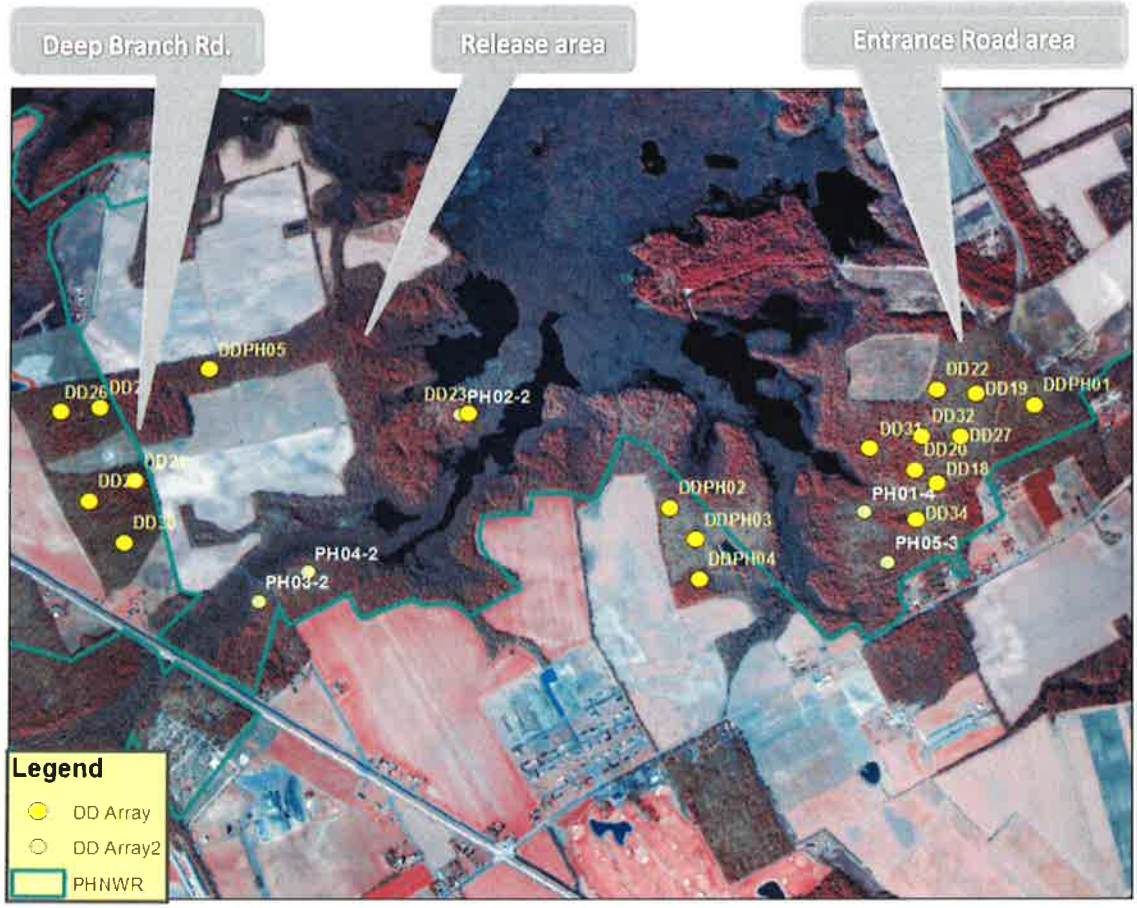

Figure 2. Camera locations for DD Array and DD Array2 at Prime Hook National Wildlife Refuge, 2011. Note – Refuge boundaries are from 2008 and are not accurate in 2011; more land has been acquired.

Figure 3: A typical trap and bait set up during the DD Array and DD Array2 photomonitoring surveys.

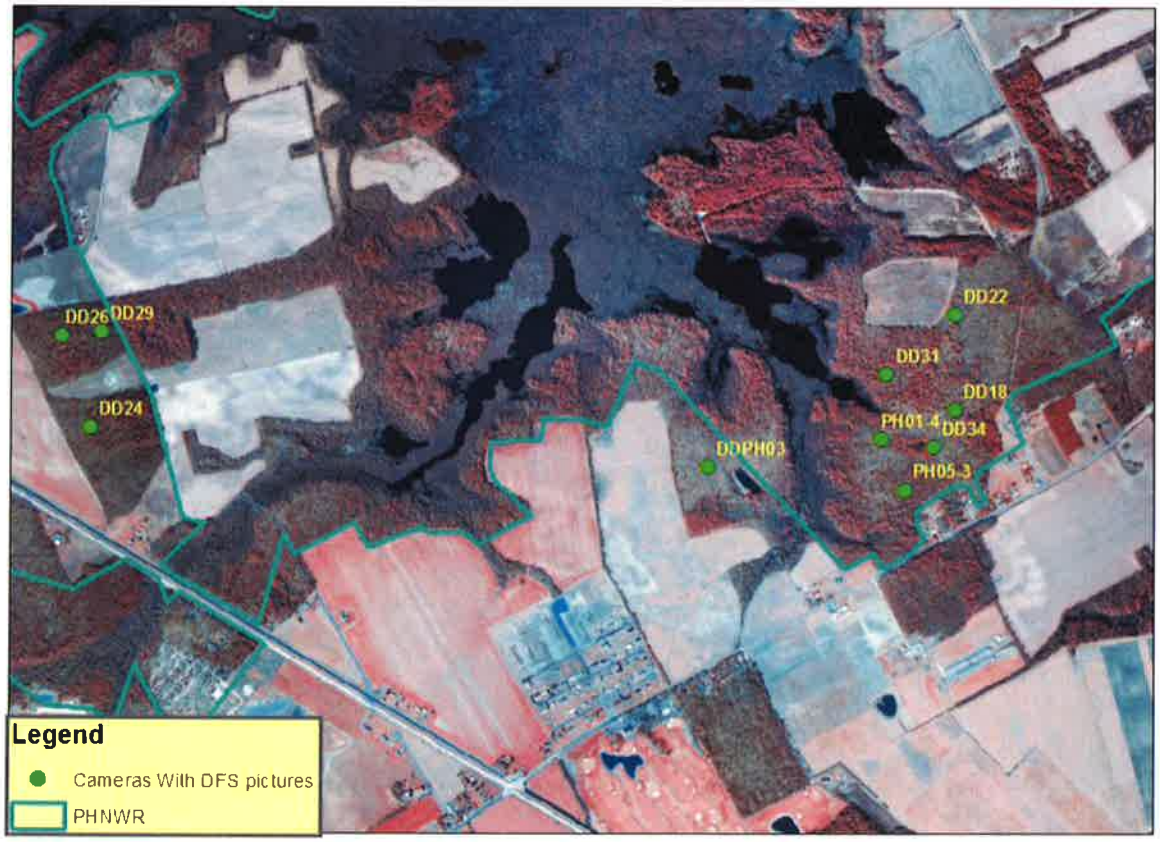

Figure 4. Delmarva fox squirrel locations documented with DD Array and DD Array2 at Prime Hook National Wildlife Refuge from surveys in spring/summer 2011. Note – Refuge boundaries are from 2008 and are not accurate; more land has been acquired.

Sample pictures from photomonitoring


2011-05-21 9:19:12 AM M 2/3
63°F


-13 10:07:35 AM M 1/3
DD-3-
PIDFIRE


-03 7:03:57 AM M 3/3
PIDFIRE


-03 7:03:53 AM M 1/3
PIDFIRE

Photomonitor Survey Protocol for Delmarva Fox Squirrel

U.S. Fish and Wildlife Service
Chesapeake Bay Field Office
177 Admiral Cochrane Drive
Annapolis, MD 21401

(Revised January 27, 2010)

The following is a recommended U.S. Fish and Wildlife Service (Service) survey protocol for the determination of the presence or absence of the endangered Delmarva fox squirrel (*Sciurus niger cinereus*) within its known historic range on the Delmarva peninsula. This protocol is recommended specifically for use in determining if Delmarva fox squirrel (DFS) are present or absent on specific project sites where an activity is proposed. This photomonitoring protocol is founded on procedures established by the Chesapeake Bay Field Office (Morris, 2000, 2003, 2005, unpublished data) and (Scherer, et al. 2006, unpublished data). Evaluations of equipment and protocol were done on sites with robust fox squirrel populations. Further efforts may be necessary in locations with small populations and the protocol may change as new information becomes available. Please check with the Service for updates before beginning a photomonitoring project.

The Service considers DFS to be likely to occur in suitable habitat within three miles of all recorded observations of DFS (see www.fws.gov/chesapeakebay/ for map of distribution buffered by three miles). Thus, if a project occurs in this area and suitable habitat exists on the project, the Service will assume that the habitat is occupied unless surveys of those specific woods are conducted. Surveys according to Service protocol are advised whenever DFS habitat may be removed or degraded by a project, or there is the likelihood that DFS may be disturbed by project construction or operation. Surveys conducted according to Service protocol, enable more site specific information about DFS presence in habitat on the project site, consequently, it is to the advantage of the project proponent to conduct adequate surveys.

Property owners are specifically advised that the Delmarva fox squirrel is listed as an endangered species (Federal Register 32:4001) and coordination with the Service and appropriate state natural resource agency is necessary prior to any action being taken to disturb the animal or its habitat. Any such actions taken without the knowledge of the Service and the appropriate state natural resource agency is a crime under both federal and state law.

Final interpretation of the photo monitoring data to determine the presence or absence of Delmarva fox squirrels on a particular site is the responsibility of the Service. Therefore, closely following the protocol and discussions of the deployment design with the Service beforehand is highly recommended.

Equipment

• Photo monitoring units
• Single-trapdoor live- traps - (minimum size of 6" x 6" x 19") with **traps disabled by wiring the door open.** The purpose of the trap is simply to hold bait but limit access to bait so that it lasts longer. (Recommended trap size is Tomahawk #103)
• Bait - Dried corncob is recommended bait, pecans can be added – especially where corn is not commonly grown in the landscape.

General Survey Procedure

1. Photo monitors should be spaced at approximately 1 unit/ 5 acres.
2. At least 2 cameras must be deployed at each survey attempt, regardless of parcel size, to account for equipment failure.
3. The disabled trap (wired open) should be heavily baited with cob corn, and bait access should be subtly restricted with dowel rods or sticks to decrease risk of bait theft. Loose kernels of corn should be placed at the front of the trap to draw animals to the area near the opening of the trap.
4. Baited trap should be placed at/near base of tree (preferably large) to maximize attractiveness to DFS.
5. Photomonitor should be positioned to capture all activity at the mouth of the trap and placed at the best distance for the model of camera. For example, Leaf River model DC 6SS work best at approximately 10-15 feet from the trap. Some other brands, ones equipped with cameras with wide angle lenses and larger areas of detection, can be placed closer.
6. Equipment must be set to record date and time and be active from sunrise to one hour after sunset. If specific times cannot be set on the camera, use the 24 hour mode.
7. Photomonitors must be set for at least 10 days, and baited on the first, fourth and seventh day (Trailmaster 1550 unit must have film checked and changed if necessary). If the 10 day period has included one or more full days of rain, high winds or storms, extend the photomonitoring period for the same number of additional days. Thus there should be at least 10 days of photomonitoring effort with reasonable weather where DFS are likely to be active. Periodic light rain is not considered to restrict activity sufficiently.
8. Cameras should be checked at each re-baiting to ensure they are working properly and that the media storage is not full. One-GB or greater memory cards are recommended.
9. To minimize wash out from the sun, place the camera approximately south of the trap.

Data collection

1. When setting up the cameras, start with an empty flash card (or film). Take a picture of yourself (or a sign with site and camera number) to start the data series with a date and time stamped photo.

2. When collecting the camera at the end of the 10 days of photomonitoring, take another picture to end the data series with a date and time stamped photo.

3. Provide this data by downloading the series of photographs onto a CD.

4. Look at the images and print out any pictures of Delmarva fox squirrels or gray squirrels. Identify the animals to the best of your ability; however, the Service retains the right for final species identification. Note, occasionally lighting and positioning do not make it possible to identify the photographed animal. However, positioning the camera to point north and keep the sun behind the camera can help prevent this problem.

5. Record the number of Delmarva fox squirrels and gray squirrels for each camera site and provide it in the final report.

Two seasons of Surveys

In reviewing determinations of DFS presence or absence, the Service will require the implementation of the protocol for **at least two separate seasonal survey efforts** prior to actions that may impact DFS or their habitats. **At least one photomonitoring effort must occur during the optimal *spring* survey period of March 15 to May 30.** A second should occur in the fall (September 15 – November 30). If DFS are found to be present on site in the first survey, there is no need for a second survey. However, two surveys are required to make a determination of DFS absence.

Surveyors

Individuals that have demonstrated their ability to set up these cameras to staff of the CBFO can deploy photomonitors. Individuals seeking to be qualified consultants for photomonitoring surveys should provide their resume to CBFO, and then demonstrate to a Service staff person the appropriate camera set up. Initial plans for placing photomonitors on project sites should be approved by CBFO endangered species staff for the first survey conducted. Photomonitor brands used must be approved by the CBFO endangered species program prior to the survey effort.

Reporting Requirements

Reports of each survey session should include the information listed below. A CD that contains a complete download of each flashcard from each camera must also accompany the report. This should provide all images taken by the camera in numerical order including the initial and end photos taken when the cameras were set up and removed from the field. **Do not rename any photos.** If Trailmaster 1550 is used, please provide a CD of the images on the film (usually an option with film development). One report, copies of all squirrel photographs taken and the CD(s) should be sent to the Endangered Species Program Supervisor, U.S. Fish and Wildlife Service, 177 Admiral Cochrane Dr., Annapolis, MD 21401. Another report should be sent to the appropriate State natural resource agency.

Reports should include:

1. Reasons for survey, name of development or other project, and description of project.
2. Map or aerial photo of survey site location showing nearby roads and towns.
3. Close-up map or aerial image showing the woodlands on site. If any woodlands are not considered to be potential habitat and thus not surveyed, these must be identified on the map and pre-approved by the Service.
4. Map of photomonitor locations at the site labeled as Camera 1, 2, 3 etc.
5. Dates of surveys and weather details (high and low temperature for each day and if any precipitation occurred).
6. Table listing animals photographed at each camera location. Especially note any locations where Delmarva fox squirrels and grey squirrels were photographed.
7. Prints of all squirrel photographs taken at each survey effort should be appended to the survey report sent to CBFO labeled with camera location number and the surveyors interpretation of the species, or state if the species in the photos could not be clearly identified.

Equipment

Available game camera models change and improve on a regular basis. The list below includes a set of cameras considered appropriate in 2007. Other models will be considered but must be shown to be effective.

Some things to consider are: 1) trigger time (time between detection and when image is captured) can range from *immediately* to *6 seconds*; the faster the better but nothing more than 3 seconds, 2) picture resolution, 3) detection width (varies from 10-90 degrees; the larger the better) and 4) battery type and life. Cameras must take color pictures and resolution should be adequate to tell a fox squirrel from a gray squirrel.

Manufacturers often exaggerate and we recommend the buyer visit an objective camera review website such as at http://www.chasingame.com/

Models that were tested and were effective at known DFS sites:

Reconyx Recommended settings - 3 shots then 1 minute quiet interval.
StealthCam V330MT
Cuddeback Excite
Cuddeback Expert
Trailmaster Infrared Trailmonitors (TM1550 Unit)

Potential Vendors for Equipment – Note many vendors are available but the following provides an initial list. We encourage all to search on line for many possibilities.

Trailcampro.com
3620 South National
Springfield, MO 65807
877-531-1665
www.Trailcampro.com

Outdoors Experience
Bloomington, IL 61704
Phone: 866-225-6737
www.outdoorsexperience.com

Cabela's Inc. –
One Cabela Drive
Sidney, NE 69160
Phone: 800-237-4444
www.cabelas.com

Trailmaster Infrared Trailmonitors
Goodson & Associates, Inc.
10614 Widmer
Lenexa, KS 66215
Phone: 800-544-5415
Fax: 913-345-8272
sales@trailmaster.com

Potential Surveyors

Three Square Wildlife Services
R.J. and A.G. Willey
4304 Bucktown Road
Cambridge, MD 21613
410-221-8283

Bryon DuBois
Trident Environmental Consultants
1856 Route 9
Toms River, NJ 08755
(732) 818-8699
(732) 818-3744 (Fax)

David Smith
Coastal Resources, Inc.
2988 Solomons Island Road
Edgewater, MD 21038
410-956-9000

Mark Burchick and Spencer Keating
Environmental Systems Analysis, Inc.
48 Maryland Ave,
Annapolis, MD 21401
410-267-0497

Kelly Pierson
Envirotech Environmental Consulting
281 Sheffield Drive
Dover, DE 19901
302-381-3990

Kelly Thompson
Skelly and Loy
2601 North Front Street
Harrisburg, PA 17110-1185
717-232-0593

Mick McLaughlin
JCM Environmental
Corporate Office
100 Lake Drive, Suite 3
Newark, Delaware 19702
302-737-9335 ext.103

Doug Potts
Environmental Consultants Inc.,
100 South Cass St.
Middletown, DE 19709
302-378-4952

Photomonitoring Supply Check List

General

- ☐ Insect repellent
- ☐ Sharpies
- ☐ Field guides
- ☐ GPS Units and Batteries
- ☐ Safety vest
- ☐ T-shirts (FW)
- ☐ Hats (FW)
- ☐ Cell phone
- ☐ Digital Camera
- ☐ Compass
- ☐ Flagging
- ☐ Field Note Book
- ☐ Sharpies
- ☐ Pencils

Photomonitoring

- ☐ Photomonitoring Cameras
- ☐ Camera manuals
- ☐ Memory cards
- ☐ Card readers
- ☐ Locks
- ☐ Keys
- ☐ Batteries
- ☐ DBH Tape
- ☐ Measuring Tape
- ☐ Map of camera locations
- ☐ Push Pins
- ☐ Data Sheets
- ☐ Write in the Rain paper
- ☐ Bungee Cords
- ☐ Traps
- ☐ Bait